IFAS: India's No. 1 Institute CSIR UGC NET, SET & All MSc. Entrance Exams

> The function of education is to teach one to think intensively and to think critically Intelligence plus character—that is the goal of true education

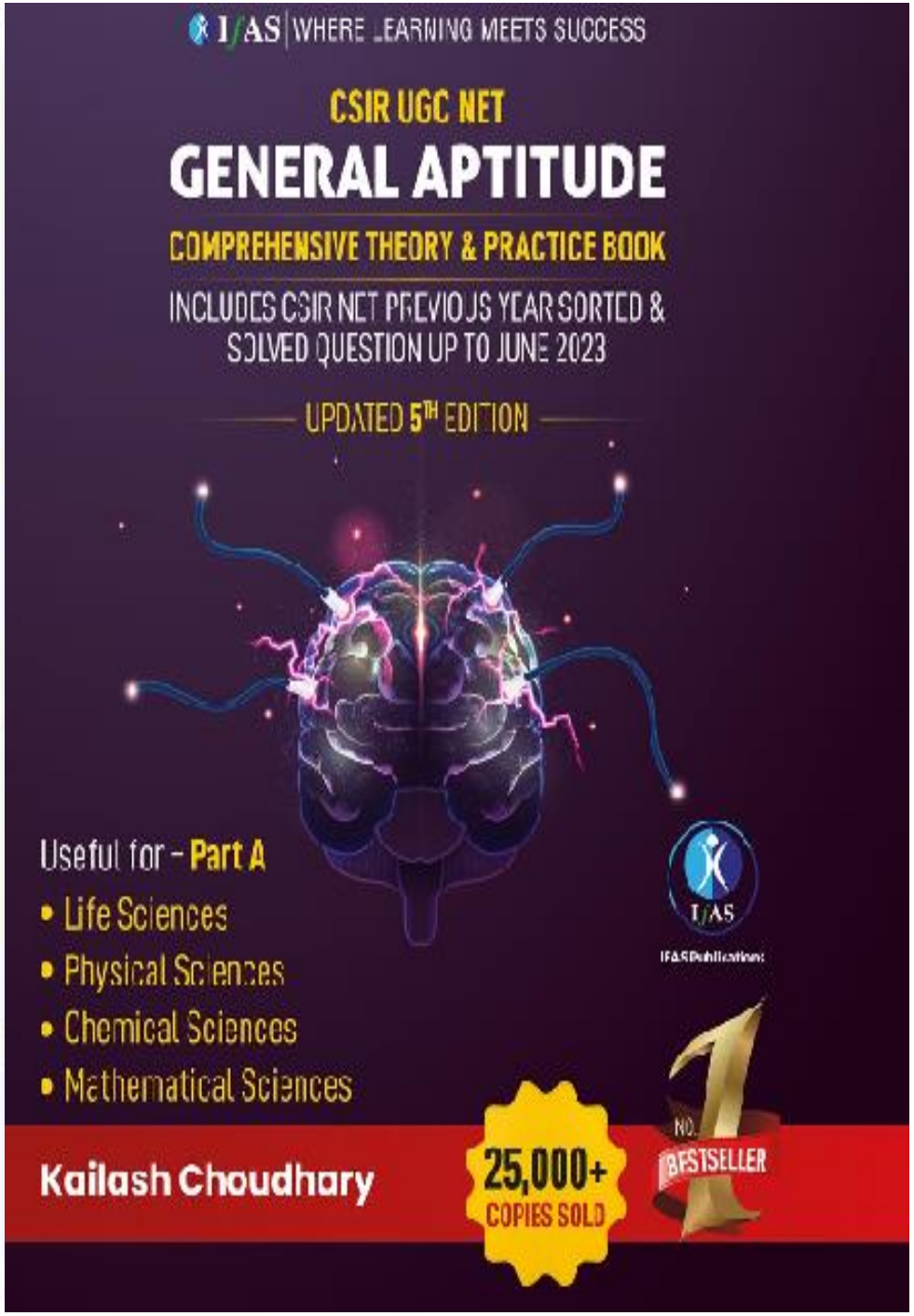
CSIR NET - GENERAL APTITUDE

QUANTITATIVE APTITUDE

L-17 | **Geometry and mensuration**

IfAS

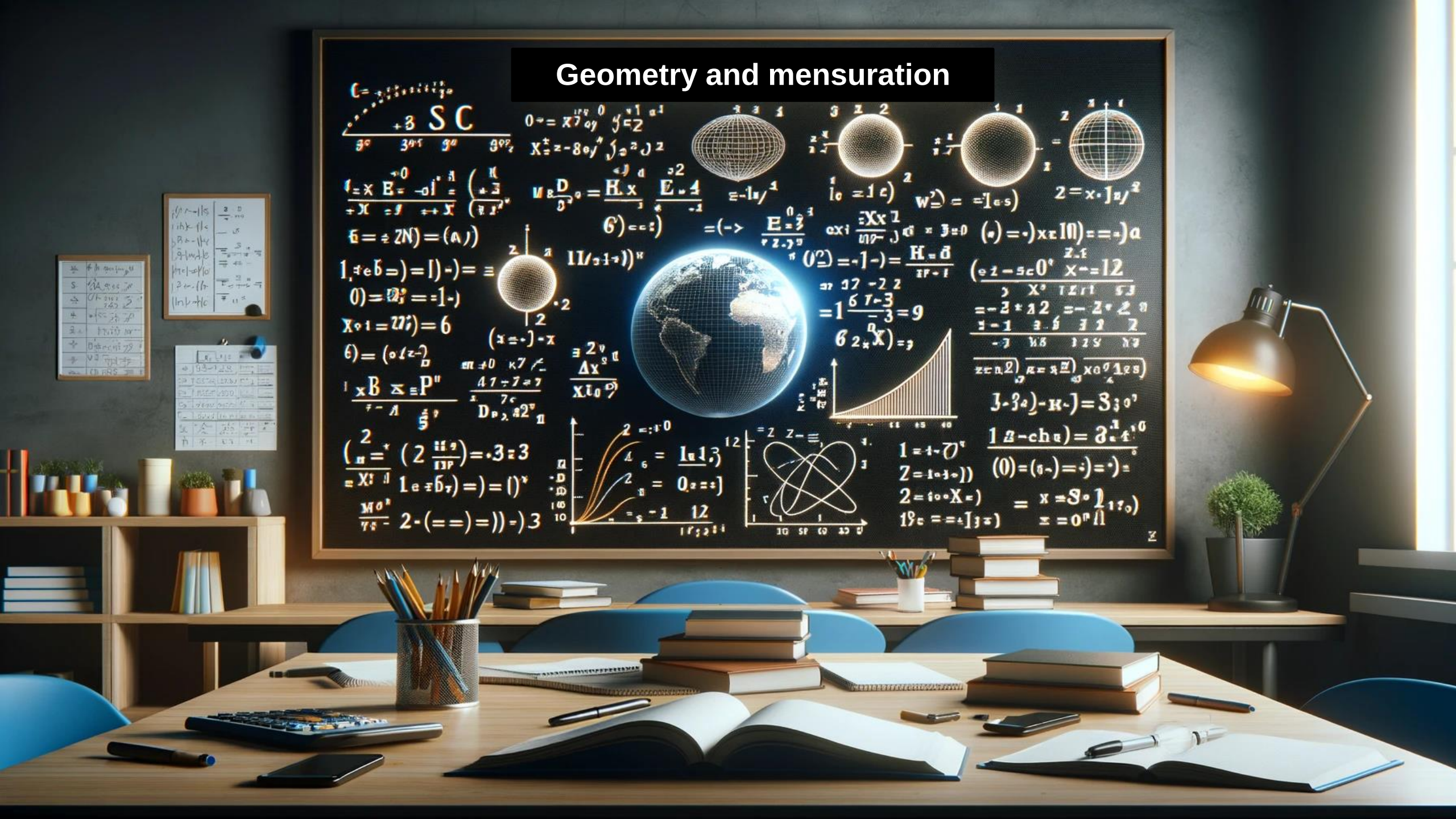
Order Online and Get Free Delivery Across India


IfAS | WHERE LEARNING MEETS SUCCESS
CSIR UGC NET
GENERAL APTITUDE
COMPREHENSIVE THEORY & PRACTICE BOOK
INCLUDES CSIR NET PREVIOUS YEAR SORTED & SOLVED QUESTION UP TO JUNE 2023
UPDATED 5TH EDITION
Useful for - Part A
• Life Sciences
• Physical Sciences
• Chemical Sciences
• Mathematical Sciences
Kailash Choudhary
25,000+ COPIES SOLD
NO. 1 BESTSELLER

Topic Covered in Today's Session

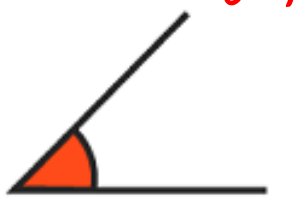
1. Types of angles
2. Important formulae
3. Polygon
3. Practice questions

Geometry and mensuration

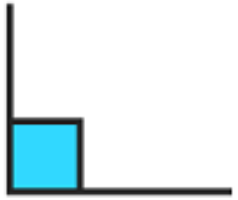


Types of angles

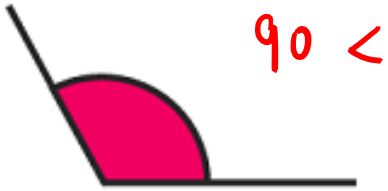
TYPES OF ANGLES



ACUTE ANGLE
Less than 90^0



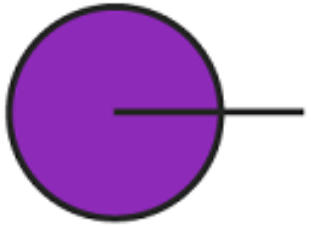
RIGHT ANGLE
Exact 90^0



OBTUSE ANGLE
Greater than 90^0
and less than 180^0

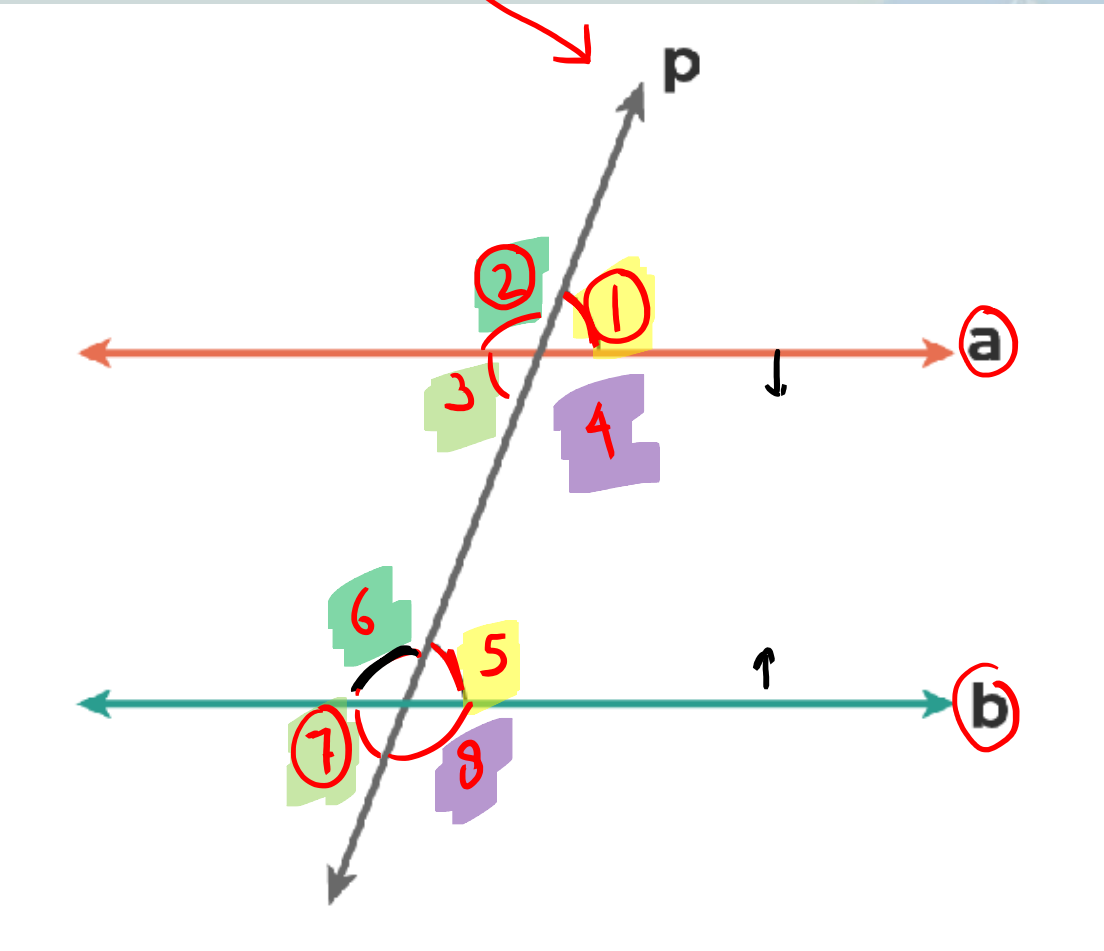
STRAIGHT ANGLE
Exact 180^0

REFLEX ANGLE
Greater than 180^0



FULL ANGLE
Exact 360^0

Transversal on two parallel lines:



① Vertically opp. Angles:

$\angle 1 = \angle 3$ $\quad \angle 5 = \angle 7$

$\angle 2 = \angle 4$ $\quad \angle 6 = \angle 8$

② Alternate interior Angles:

$\angle 4 = \angle 6$ $\quad \angle 3 = \angle 5$

③ Alternate exterior Angles:

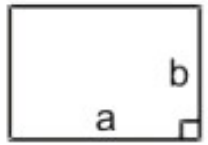
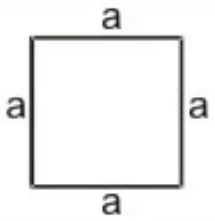
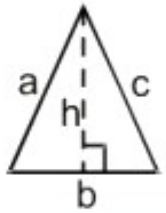
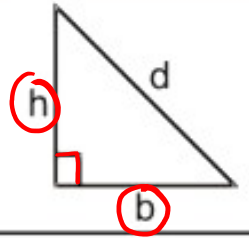
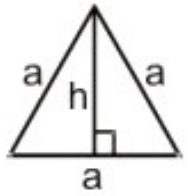
$\angle 2 = \angle 8$ $\quad \angle 1 = \angle 7$

④ Corresponding Angles:

$\angle 1 = \angle 5$ $\quad \angle 2 = \angle 6$

$\angle 4 = \angle 8$ $\quad \angle 3 = \angle 7$

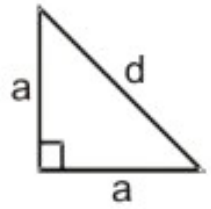
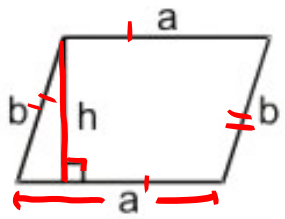
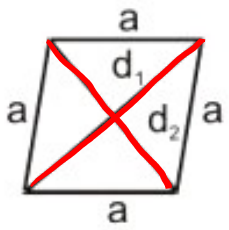
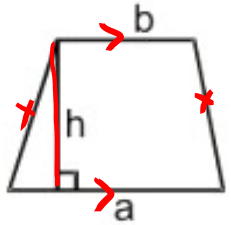
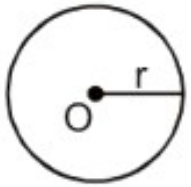
Important formulae

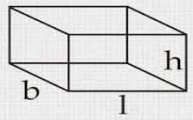
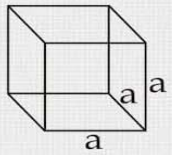
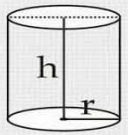
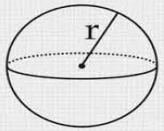
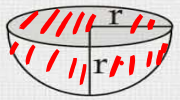
Name	Figure	Perimeter	Area
Rectangle		2 (a + b)	ab
Square		4a	a^2
Triangle		a + b + c = 2s	$1 = \frac{1}{2} \times b \times h$ $2 = \sqrt{s(s-a)(s-b)(s-c)}$
Right triangle		b + h + d	$\frac{1}{2}$ bh
Equilateral triangle		3a	1. $\frac{1}{2}$ ah 2. $\frac{\sqrt{3}}{4} a^2$

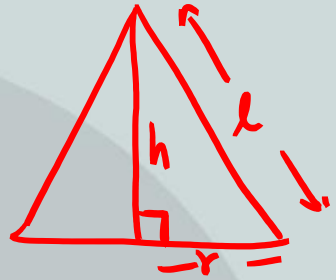
$\left(s = \frac{a+b+c}{2}\right)$

(Scalene Δ)

Area = $\sqrt{s(s-a)(s-b)(s-c)}$

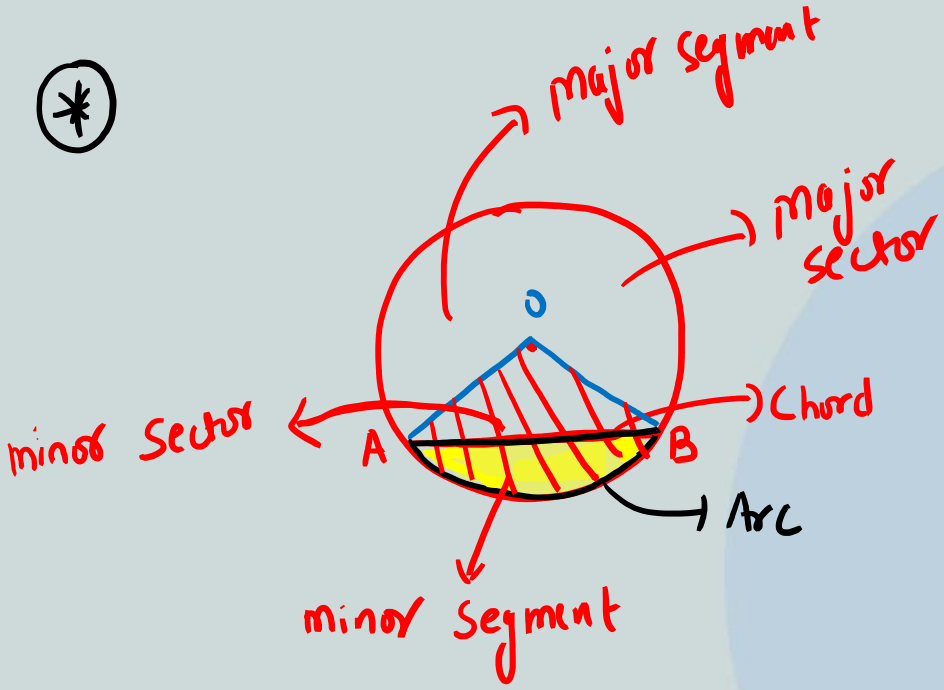
Isosceles right triangle		2a + d	$\frac{1}{2}a^2$
Parallelogram		2 (a + b)	ah
Rhombus		4a	$\frac{1}{2}d_1d_2$
Trapezium		Sum of its four sides	$\frac{1}{2}h(a+b)$
Circle		$2\pi r$	πr^2

Name of the solid	Figure	Volume	Laterial/Curved Surface Area	Total Surface Area
Cuboid		lbh	2lh + 2bh or 2h(l+b)	2lh+2bh+2lb or 2(lh+bh+lb)
Cube		a^3	$4a^2$	$4a^2+2a^2$ or $6a^2$
Right circular cylinder		$\pi r^2 h$	$2\pi rh$	$2\pi rh + 2\pi r^2$ or $2\pi r(h+r)$
Right circular cone		$\frac{1}{3}\pi r^2 h$	πrl	$\pi rl + \pi r^2$ or $\pi r(l+r)$
Sphere		$\frac{4}{3}\pi r^3$	$4\pi r^2$	$4\pi r^2$
Hemisphere		$\frac{2}{3}\pi r^3$	$2\pi r^2$	$2\pi r^2+\pi r^2$ or $3\pi r^2$



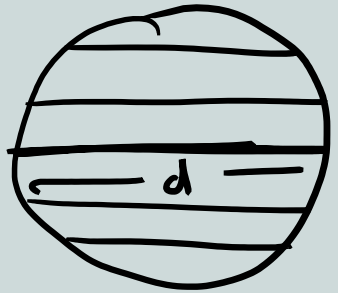
$$l^2 = h^2 + r^2$$

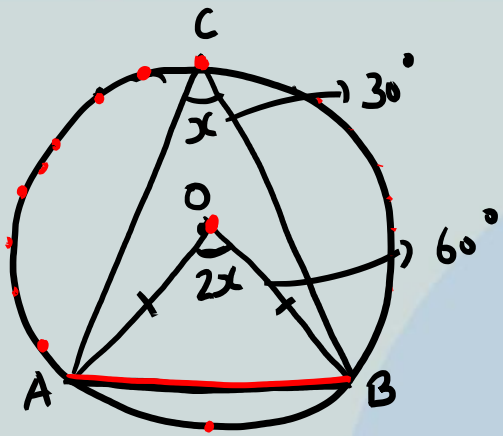
Properties

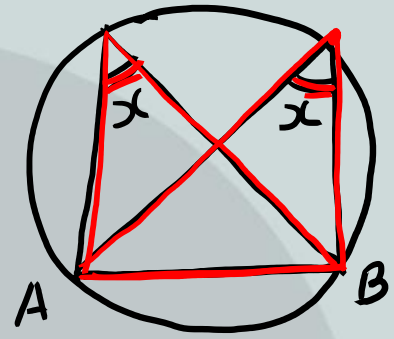


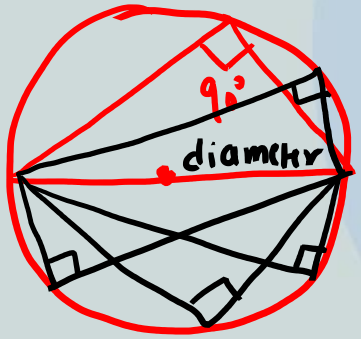
$\overline{AB}$ → Chord

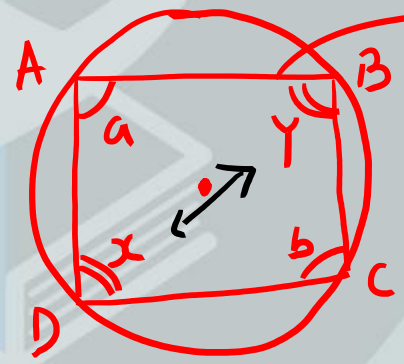
$\overset{\frown}{AB}$ → Arc



① 

② 

③ 

④ 

→ Cyclic Quad

$a + b = 180°$

$x + y = 180°$

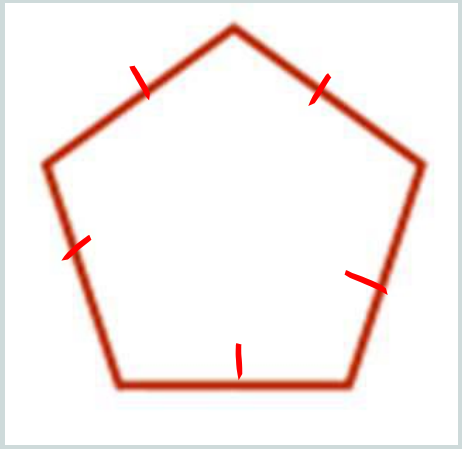
Polygon

→ Closed fig. formed from sides

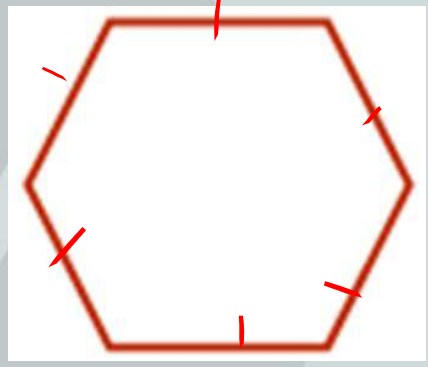
Regular Irregular

Trapezium

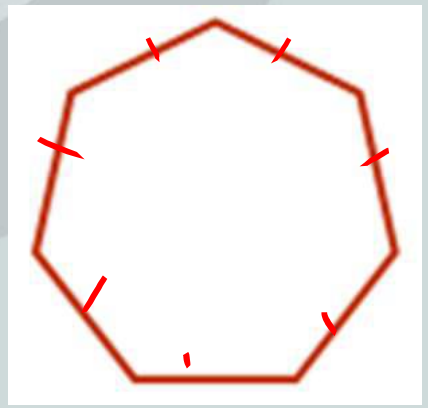
Pentagon



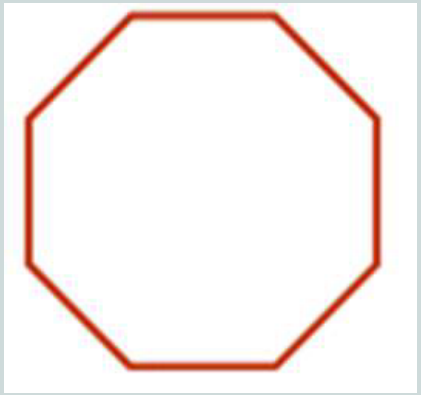
Hexagon



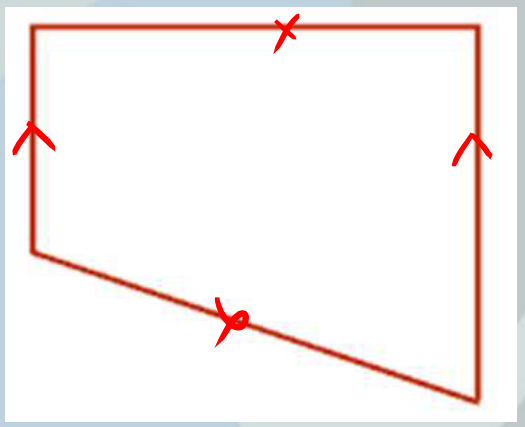
Heptagon



Octagon:



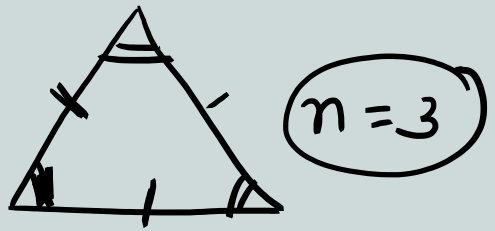
Irregular Polygon:



Sum of interior angles of a polygon:

Sum of interior angles = (n-2)×180°

Where n is the number of sides of the polygon.



$(n-2)\,180$

$(3-2)\times 180$

180^0

Polygon	No of Sides	Sum of Interior Angles
Triangle	3	180^0
Square	4	360^0
Rectangle	4	360^0
Rhombus	4	360^0
Trapezium	4	360^0
Parallelogram	4	360^0
Pentagon	5	540^0
Hexagon	6	720^0
Heptagon	7	900^0
Octagon	8	1080^0
Decagon	10	1440^0

Angle between adj sides = $\frac{(n-2)\,180}{n}$

Q1. Sum of all the internal angles of a regular octagon is _____ degrees.

1. 360
2. 1080
3. 1260
4. 900

$n = 8$

$= (n-2)\,180^\circ$

Sum $\Rightarrow (8-2)\,180^\circ$

$6 \times 180^\circ = 1080^\circ$

Q2. For a regular polygon having 10 sides, the interior angle between the sides of the polygon, in degree is

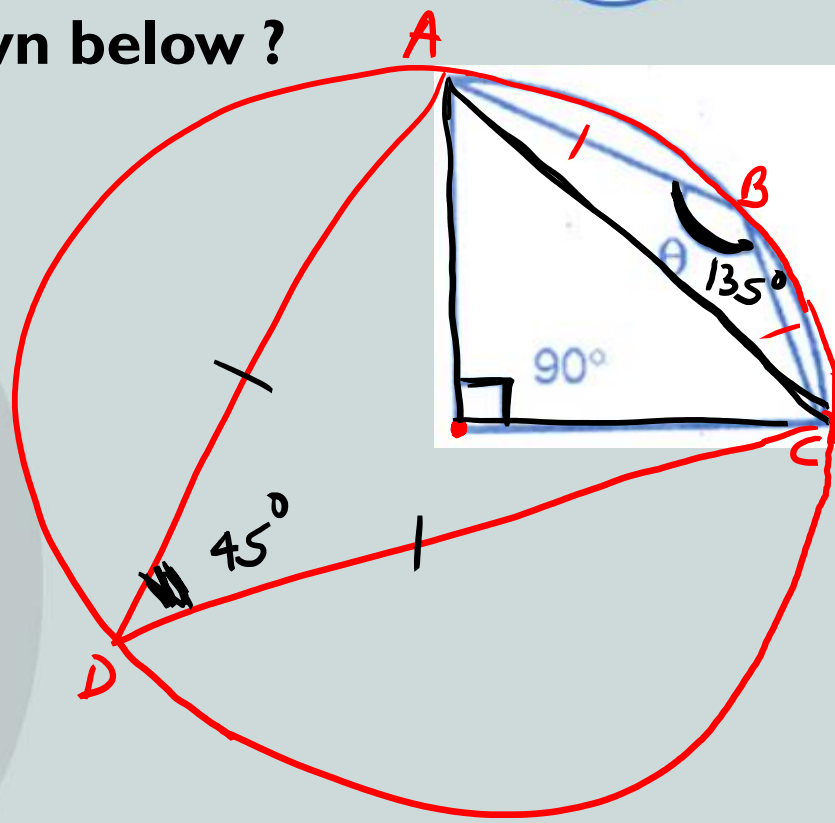
$n = 10$

(A) 324 (B) 216 (C) 144 (D) 396

$$\text{Angle} = \frac{(n-2)180}{n} = \frac{(10-2)\,18\cancel{0}}{1\cancel{0}}$$

$$= 8 \times 18 = 144^\circ$$

Q3.What is the angle θ in the quadrant of a circle shown below ?



1) 135^0
2) 90^0
3) 120^0
4) May have any value between 90^0 and 120^0

Q4. In Δ ABC, angle A is larger than angle C and smaller than angle B by the same amount. If angle B is 67^0, angle C is:

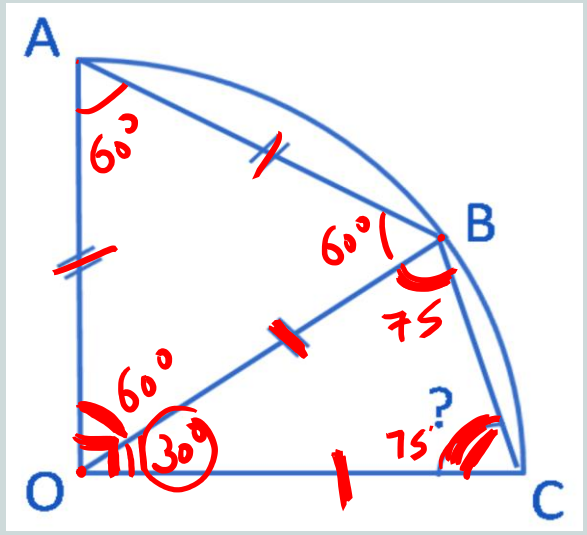
(1) 67^0 **(2) 53^0**
(3) 60^0 **(4) 57^0**

Q5. OA, OB and OC are radii of the quarter circle shown in the figure. AB is also equal to the radius.

What is angle OCB?

(1) 60^0 **(2) 75^0**

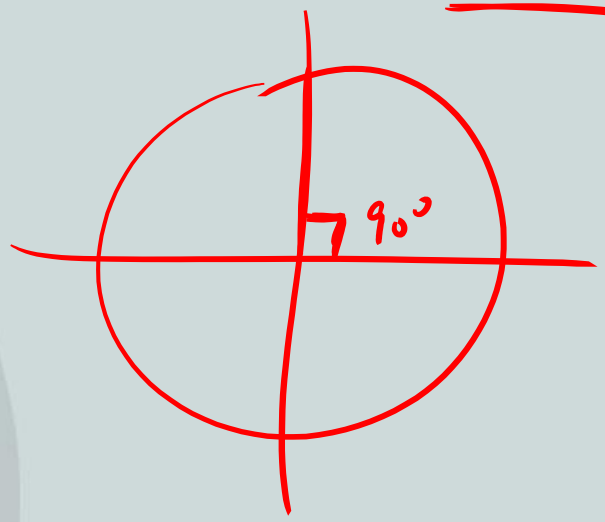
(3) 55^0 **(4) 65^0**



$30 + x + x = 180$

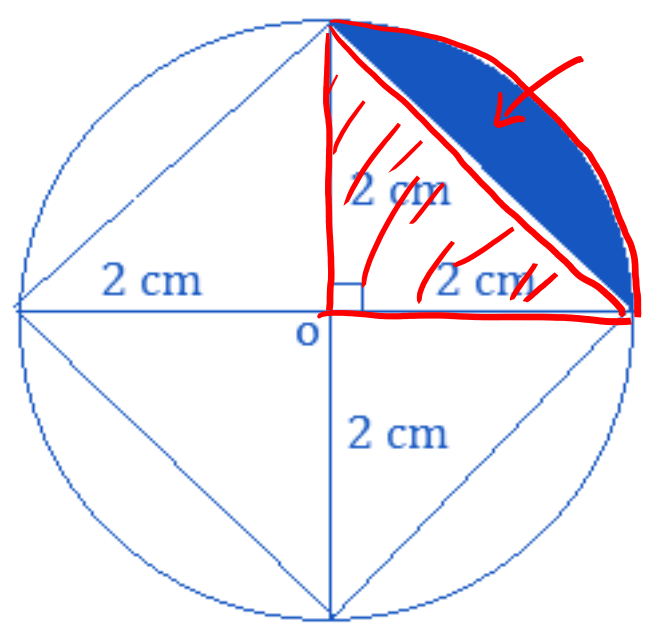
$2x = 150$

$x = \frac{150}{2} = 75^0$



Q6. The area of shaded region in cm^2.

(1) $(\pi-\sqrt{2})$ (2) $(\pi-2)$
(3) $(\pi/4-\sqrt{2}/2)$ (4) $(\pi+2)$



Area of Quarter circle − Area Right $\triangle$

$$\text{Area} = \frac{\pi r^2}{4} - \frac{1}{2} \times 2 \times 2$$

$$\frac{\pi(2^2)}{4} - 2$$

$$(\pi - 2) \text{ Ans}$$

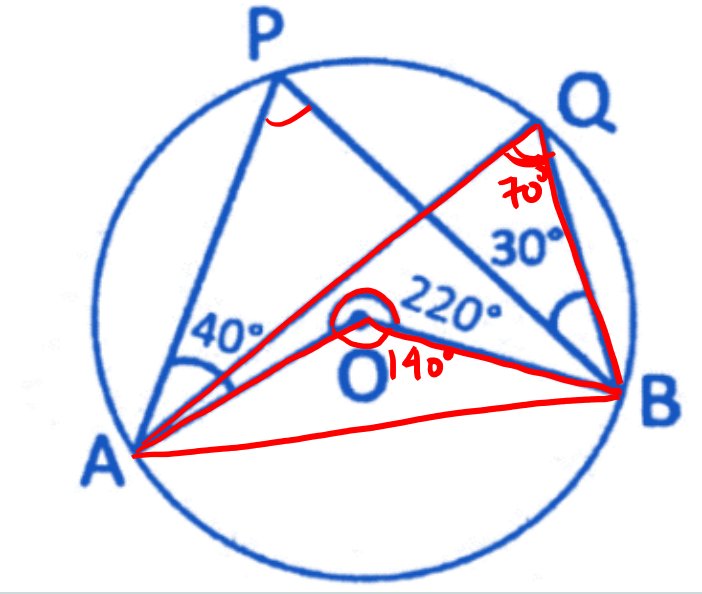
Area of $\triangle = \frac{1}{2} \times b \times h$

Q7. In a given circle, O is the centre, $\angle PAO = 40^0$, $\angle PBQ = 30^0$ and the outer angle $\angle AOB = 220^0$

Then $\angle AQB$ is

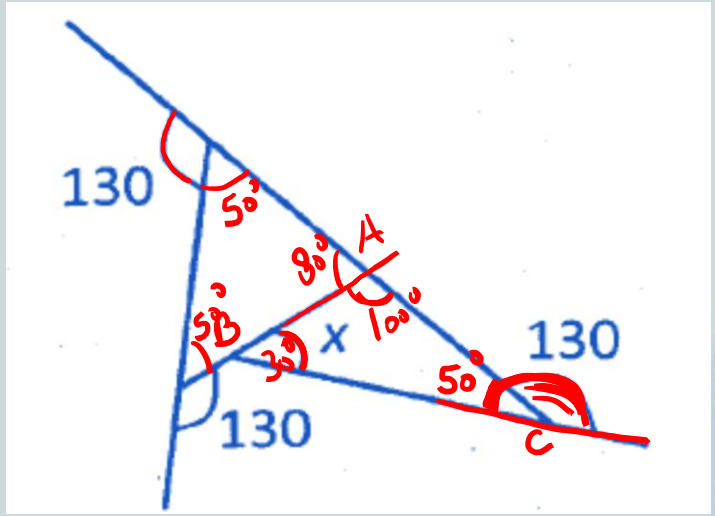
(1) 70^0 **(2) 80^0**

(3) 60^0 **(4) 110^0**



$360 - 220 = 140$

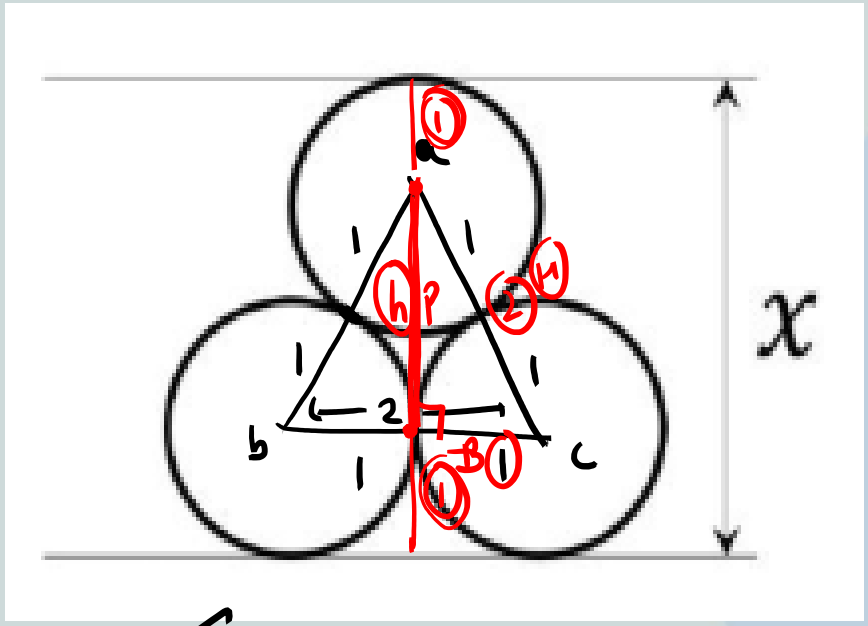
Q8. What is angle *x* in the schematic diagram given below?



(1) 60 (2) 50
(3) 40 (4) 30

PYQ

Q9. Three identical rings of radius 1 unit are stacked as shown in the figure. The length x is



$\frac{1}{2} \times b \times h = \frac{\sqrt{3}}{4} a^2$ (1)

$\frac{1}{2} \times 2 \times h = \frac{\sqrt{3}}{4}$ (2)

$h = \sqrt{3}$

$\Rightarrow P^2 = H^2 - B^2$

$P^2 = 2^2 - 1^2$

$P = \sqrt{4-1}$

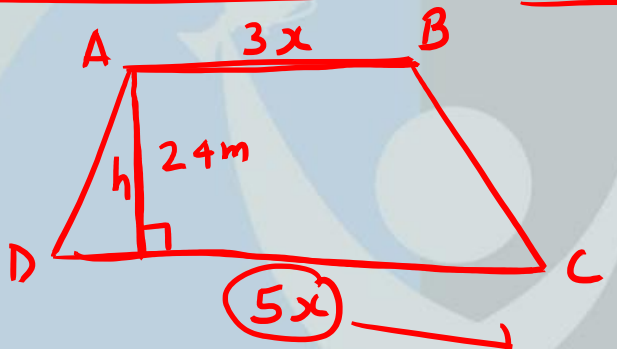
$P = \sqrt{3}$

$x = \sqrt{3} + 2$

1. $2 + \sqrt{3}$
2. $2 + \sqrt{2}$
3. $2 + 2\sqrt{\frac{2}{3}}$
4. 3

Q10. The area of a field in the shape of trapezium measures 1440 m². The perpendicular distance between its parallel sides is 24 m. If the ratio of the parallel sides is 5 : 3, the length of the longer parallel side is:

(a) 45 m
(b) 60 m
(c) 75 m
(d) 120 m



$\text{Area} = \frac{1}{2} \times (AB + DC) \times h$

$5x = 5 \times 15 = 75\ m$

$1440 = \frac{1}{2}(3x + 5x) \times 24$

120

$15 \quad 120 = 8x$

$x = 15$

Q11. The ratio of the volume of two cones is 2 : 3 and the ratio of radii of their base is 1 : 2. The ratio of their height is

(a) 3 : 8
(b) 8 : 3
(c) 4 : 3
(d) 3 : 4

$$\text{Volume} = \frac{1}{3}\pi r^2 h$$

$$3V = \pi r^2 h$$

$$\boxed{\frac{3V}{\pi r^2} = h}$$

$$\frac{h_1}{h_2} = \frac{\frac{3 \cdot 2}{\pi \times 1}}{\frac{3 \cdot 3}{\pi (2)^2}} = \frac{\frac{2}{1}}{\frac{3}{4}} = \frac{2}{1} \times \frac{4}{3}$$

$$= \frac{8}{3} \Rightarrow 8 : 3$$

Q12. The curved surface area and the total surface area of a cylinder are in the ratio 1 : 2. If the total surface area of the right cylinder is 616 cm square, then its volume is :

(a) 1232 cm cube
(b) 1848 cm cube
(c) 1632 cm cube
(d) 1078 cm cube

$\frac{TSA}{CSA} = \frac{2}{1} \Rightarrow \frac{2\pi r(r+h)}{2\pi rh} = \frac{2}{1}$

$r + h = 2h$

$\boxed{r = h} = 7\,cm$

$TSA = 616 = 2\pi r(r+h)$

$616 = 2 \times \frac{22}{7} \times r(r+r)$

$14 \times 7 = r \times 2r$

$7 \times 7 = 2r^2$

$7^2 = r^2$

$\boxed{r = 7}\,cm$

Volume $= \frac{22}{7} \times 7^2 \times 7$

$= 22 \times 49$

$= 1078\,cm^3$

Q13. A solid cube having volume 46656 cm^3 is cut into 27 cubes of equal volume. The surface area (in cm^2) of the smaller cubes is:

1) 864
2) 756
3) 936
4) 921

Volume of smaller cube = $\frac{46656}{27}$ = 1728 cm^3

2	1728
2	864
2	432
2	216
6	
6	
6	

Volume $\Rightarrow a^3 = 1728$

$a = \sqrt[3]{2\times2\times2\times6\times6\times6}$

$a = 2\times6$

$a = 12$

$SA = 6a^2 = 6\times12\times12 = 6\times144$

$864\ cm^2$

Q14. The length, breadth and height of a box are in the ratio 4 : 3 : 2. If the length is increased by 50% and the height is decreased by 40%, then the ratio of the new volume to the old volume of the box will be:

1) 3 : 2
2) 1 : 3
3) 11 : 8
4) 9:10

$$\frac{\text{New volume}}{\text{old volume}} = \frac{60 \times 30 \times 12^{3}}{40 \times 30 \times 20} = \frac{9}{10}$$

$$24 \times \frac{6}{12} = 12$$

Q15. A granite block of 2 m x 5 m x 3 m size is cut into 5 cm thick slabs of 2 m x 5 m size. These slabs are laid over a 2 m wide pavement. What is the length of the pavement that can be covered with these slabs?

(1) 100 m (2) 200 m
(3) 300 m (4) 500 m

Q16. A rectangular flask of length 11 cm, width 8 cm and height 20 cm has water filled up to height 5 cm. If 21 spherical marbles of radius 1 cm each are dropped in the flask, what would be the rise in water level ?

(1) 8.8 cm (2) 10 cm
(3) 1 cm (4) 0 cm

Q17. A plate of 5m × 2m size with uniform thickness, weighing 20 kg, is perforated with 1000 holes of 5cm × 2cm size. What is the weight of the plate (in kg) after perforation?

(1) 10 (2) 2

(3) 19.8 (4) 18

Q18. If there was 10 cm of rain over one-hectare field, what is the total volume (in cubic meters) of rain over the field?

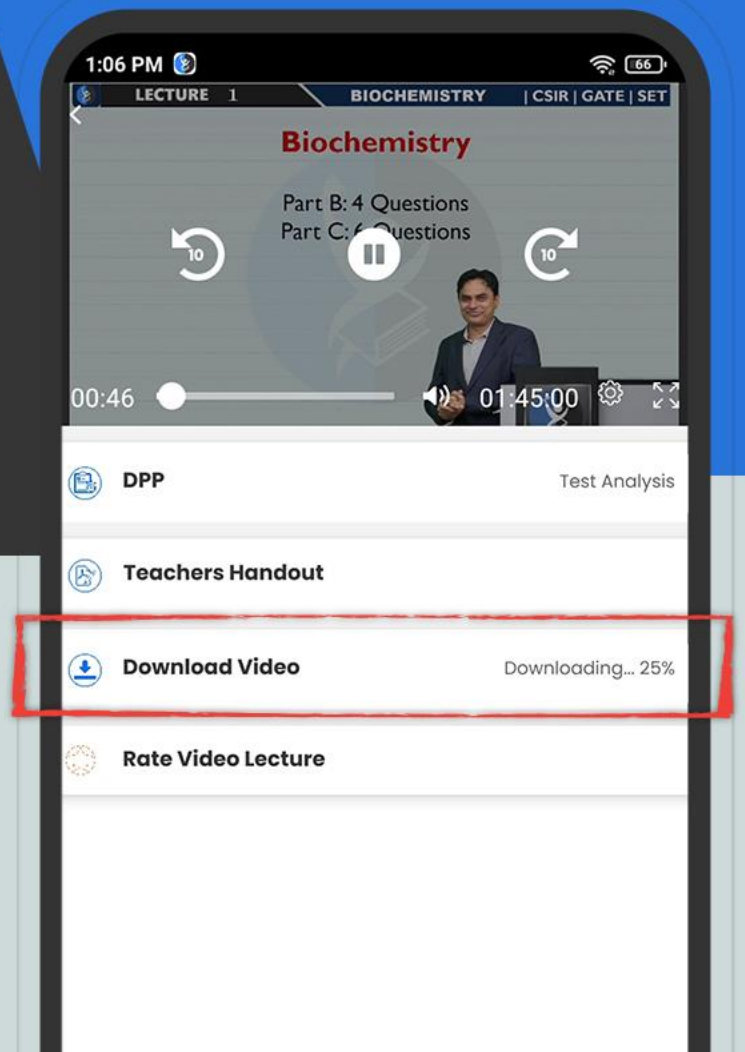
1. 1
2. 10
3. 100
4. 1000

IfAS

UGC NET | SET | PSC

SAVE YOUR INTERNET DATA USAGE!

Minimize Internet Usage by Downloading Lectures from the IFAS App & Access them Offline



IfAS

Harshada Sharma

Earned: ₹25,500

"As is widely recognized, IFAS stands as India's leading institute for IIT JAM examination preparation. My Personal philosophy has always revolved around helping others and I've had the pleasure of introducing the IFAS Online Course to 12 of my classmates and juniors, which in turn allowed me to earn 25,500 rupees. You too can join in and refer your friends, allowing you to earn a 5% rewards based on the fees each of your referred friends Pay"

REFER & EARN

Step – 01 Invite Friends

Share your referral code or Link with your friends.

Step – 02 Earn Cashback

On Every Purchase made using your referral code, you earn 5% instant cashback in your bank account.

Step – 03 Refer More, Earn More

Keep referring as many friends as you can and keep **Earning** cash as much as you can

Friendship is Sharing, Caring, Giving & Helping Each Other...!